

REMARKS/ARGUMENTS

Reconsideration of the application as amended is respectfully requested.

Status of the Claims

Claims 1, 2, 4-12 and 14-21 are pending in the application, with claims 1, 14 and 17 being the only independent claims. Claims 1, 2, 4-12, 14, 15 and 17 have been amended. Claim 13 has been canceled, without prejudice.

Overview of the Office Action

Claims 1 and 4-21 stand rejected under 35 U.S.C. 103(a) as being unpatentable over EP Patent Application No. 1 263 031 (*Koike*).

Claim 2 stands rejected under 35 U.S.C. 103(a) as being unpatentable over *Koike* in view of an article written by Hageman et al. (*Hageman*).

Summary of the Applied Prior Art and Subject Matter Disclosed in the Specification

Summary of Koike

Koike discloses a method for producing a Group III-nitride compound-semiconductor component by means of epitaxial growth, wherein a mask layer 4 is used to etch a layer 31 of a first Group III-nitride compound-semiconductor. This first Group III-nitride compound-semiconductor layer 31 is formed directly on a buffer layer 2 which is in turn formed directly on a substrate 1. Trenches (no assigned reference numeral in the drawings) are formed in the first semiconductor layer 31. A second Group III-nitride compound-semiconductor layer 32 is

epitaxially grown, vertically and laterally, within the trenches. See Figs. 1A-1E; and paragraphs [0019] and [0030] of *Koike*.

Summary of the Subject Matter Disclosed in the Specification

In contrast, the present application discloses the surprising discovery that the semiconductor material (Group III-nitride compound-semiconductor material) 5 can be laterally grown on the flanks of pits 41 formed within the substrate 1. Thus, there is no need to form the pits (or trenches) within an additional semiconductor layer, i.e. the first Group III-nitride compound-semiconductor layer 31 of *Koike* is eliminated.

In summary, the present specification reveals that there is no need for *Koike's* first Group III-nitride compound-semiconductor layer 31 into which the trenches were etched. In one embodiment of the present invention, the mask layer is arranged directly onto the substrate 1, and the pits 41 are etched directly into the substrate 1. Thus, this arrangement provides the significant advantage of fewer layers and, therefore, lower costs as compared to the method described by *Koike*.

In another embodiment of the present invention, a second mask layer is formed on the semiconductor material 5. The second mask layer has a plurality of windows leading to the semiconductor material 5. Then, a second semiconductor material is deposited on the semiconductor material 5 through the windows of the second mask layer. See paragraph [0031] of the published specification.

The above descriptive details are based on the present specification. They are provided only for the convenience of the Examiner as part of the discussion presented herein, and are not intended to argue limitations which are unclaimed.

Allowability of the Claims

Independent Claim 1

Independent claim 1 has been amended to recite the following:

“forming a mask layer directly on a substrate comprising at least one of silicon, silicon carbide and sapphire” (emphasis added).

Support for such amendment can be found in original claim 13 and paragraphs [0023] and [0056] of the published specification.

Applicants respectfully submit that amended claim 1 is patentable over *Koike* because *Koike* fails to teach or suggest all of the limitations of amended claim 1. In particular, *Koike* fails to teach or suggest forming a mask layer directly on a substrate comprising at least one of silicon, silicon carbide and sapphire, as expressly recited in amended claim 1.

As discussed above, *Koike* discloses a method for producing a Group III-nitride compound-semiconductor component by means of epitaxial growth. In *Koike*'s method, a first Group III-nitride compound-semiconductor layer 31 is formed directly on a buffer layer 2 which is in turn formed directly on a substrate 1. A mask layer 4 is formed directly on the first Group III-nitride compound-semiconductor layer 31 so that trenches (no assigned reference numeral in the drawings) can be formed in the first Group III-nitride compound-semiconductor layer 31 by etching. See Figs. 1A-1E and paragraph [0030] of *Koike*.

In other words, in *Koike*, the mask layer 4 is not formed directly on the substrate 1. Rather, the mask layer 4 is formed directly on the first Group III-nitride compound-semiconductor layer 31, which by definition does not comprise silicon, silicon carbide or sapphire. Therefore, *Koike* fails to teach forming a mask layer directly on a substrate comprising one of silicon, silicon carbide and sapphire, as expressly recited in amended claim 1 of the present application.

Furthermore, as the Examiner points out, *Koike* explicitly teaches that “the substrate 1 and the buffer layer 2 are not essential elements of the present invention” (see paragraph [0018] of *Koike*). In view of this teaching and the fact that *Koike* also explicitly teaches forming the mask layer 4 directly on the first Group III-nitride compound-semiconductor layer 31 so that the mask layer 4 can be used to form trenches in the first Group III-nitride compound-semiconductor layer 31 by etching, a person with ordinary skill in the art would not be motivated to modify *Koike* by forming the mask layer 4 directly on a substrate comprising one of silicon, silicon carbide and sapphire. Therefore, *Koike* also fails to suggest forming a mask layer directly on a substrate comprising one of silicon, silicon carbide and sapphire, as expressly recited in amended claim 1.

In view of the foregoing, withdrawal of the rejection of claim 1 under 35 U.S.C. 103(a) is respectfully requested.

Independent Claim 14

Independent claim 14 has been amended to recite “a mask layer arranged directly on a substrate comprising at least one of silicon, silicon carbide and sapphire.” Thus, amended claim 14 is patentable for reasons discussed above in connection with amended claim 1. Therefore, withdrawal of the rejection of claim 14 under 35 U.S.C. 103(a) is also respectfully requested.

Independent Claim 17

Independent claim 17 has been amended to recite the following:

“forming a second mask layer on the first semiconductor material, said second mask layer having a plurality of windows onto the first semiconductor material; and

through the windows of the second mask layer, depositing a second semiconductor material on said first semiconductor material” (emphasis added).

Support for such amendment can be found in paragraph [0031] of the published specification.

Applicants respectfully submit that amended claim 17 is patentable over *Koike* because *Koike* fails to teach or suggest all of the limitations of amended claim 17. In particular, *Koike* fails to teach or suggest the above-quoted limitations of amended claim 17.

The Examiner refers to Figs. 6C, 6D and 7 of *Koike*, and contends that *Koike* discloses forming a second mask layer 5 and depositing a second semiconductor material.

However, in the embodiment shown in Fig. 6C of *Koike*, the second mask 5 is formed on the bottoms of the trenches and directly on the substrate 1 (*see* also paragraph [0067] of *Koike*). The first Group III-nitride compound-semiconductor layer 31 is disposed above the second mask 5. Furthermore, in the embodiment shown in Fig. 6D of *Koike*, the second mask 5 is formed on the bottoms of the trenches and directly on a second buffer layer 23 (*see* also paragraph [0068] of *Koike*). The first Group III-nitride compound-semiconductor layer 31 is disposed next to the second mask 5. Therefore, *Koike* fails to teach or suggest forming a second mask layer on the first semiconductor material, the second mask layer having a plurality of windows onto the first semiconductor material, as recited in amended claim 17 of the present application.

Moreover, *Koike* explicitly teaches forming the second Group III-nitride compound-semiconductor layer 32 from the second mask 5 which is on the bottoms of the trenches (*see*

paragraphs [0030], [0067] and [0068] of *Koike*). Therefore, *Koike* also fails to teach or suggest depositing a second semiconductor material on the first semiconductor material through the windows of the second mask layer, as recited in amended claim 17.

In view of the foregoing, withdrawal of the rejection of claim 17 under 35 U.S.C. 103(a) is respectfully requested.

Dependent Claims 2, 4-12, 15, 16 and 18-21

Claims 2, 4-12, 15, 16 and 18-21 depend, either directly or indirectly, from independent claim 1, 14 or 17 and, thus, each is allowable therewith.

In addition, these dependent claims include features which serve to still further distinguish the claimed invention over the prior art of record.

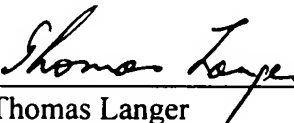
Conclusion

Based on all of the above, it is respectfully submitted that the present application is now in proper condition for allowance. Prompt and favorable action to this effect and early passing of this application to issue are respectfully solicited.

Should the Examiner have any comments, questions, suggestions or objections, the Examiner is respectfully requested to telephone the undersigned in order to facilitate reaching a resolution of any outstanding issues.

Respectfully submitted,

COHEN PONTANI LIEBERMAN & PAVANE LLP

By 
Thomas Langer
Reg. No. 27,264
551 Fifth Avenue, Suite 1210
New York, New York 10176
(212) 687-2770

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